

Before the  
**FEDERAL COMMUNICATIONS COMMISSION**  
Washington D.C. 20554

In the Matter of	)	
	)	
The Development of Operational, Technical and	)	
Spectrum Requirements for Meeting Federal,	)	WT Docket No. 96-86
State and Local Public Safety Communications	)	
Requirements Through the Year 2010	)	

**REPLY COMMENTS OF MOTOROLA**

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June 13, 2005

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## Summary

Motorola hereby replies to comments submitted in response to the 7<sup>th</sup> *NPRM* in this proceeding. First, Motorola reiterates its recommendation that the Commission adopt the TIA-902 (SAM) suite of standards as the 700 MHz wideband interoperability standard for public safety services. TIA-902 (SAM) is an industry-consensus standard and its appropriateness is not undermined by proprietary intellectual property rights (IPR) as asserted by some commenters. To this end, Motorola repeats its commitment previously made to the National Coordinating Committee (NCC) that it will license its essential IPR on a royalty-free basis for use on the 700 MHz wideband interoperability channels. TIA-902 (SAM) is also a highly adaptive technology that is capable of balancing coverage and throughput requirements of a diverse user group. Also, there is no basis in fact to support the implications that TIA-902 (SAM) may cause interference because it uses the same modulation as 800 MHz iDEN technology. For these reasons, the FCC should accept the recommendations of TIA and the NCC and adopt TIA-902 (SAM) as the 700 MHz wideband interoperability standard.

Motorola also urges the Commission to allow 700 MHz public safety licensees to transmit station identifications in the digital mode of operation. The record demonstrates that there is no controversy with providing 700 MHz licensees the same flexibility already provided to 800 MHz and 900 MHz licensees. This issue requires immediate attention to avoid an unnecessary increase in equipment costs to public safety users.

Finally, Motorola urges the Commission to reject the recommendation of M/A-Com to reduce certain Adjacent Channel Coupled (ACP) requirements for 6.25 kHz, 12.5 kHz and 25 kHz bandwidth equipment. M/A-Com has not submitted sufficient technical information to justify the adoption of these proposals. As such, the Commission should reject M/A-Com's recommendations and instead favor the industry-consensus positions submitted by TIA.

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**REPLY COMMENTS OF MOTOROLA**

Motorola, Inc. (Motorola) hereby replies to comments submitted in response to the Seventh Notice of Proposed Rulemaking in this proceeding.<sup>1</sup> Motorola reiterates its recommendation that the Commission adopt the TIA-902 (SAM) suite of standards as the wideband interoperability standard. TIA-902 (SAM) is an industry-consensus standard and its appropriateness is not undermined by proprietary intellectual property rights (IPR) as asserted by some commenters. Motorola also urges the Commission to act quickly to allow 700 MHz public safety licensees to transmit station identifications in the digital mode of operation as the record demonstrates that there is no controversy with providing 700 MHz licensees with this same flexibility that is already provided to 800 MHz and 900 MHz licensees. Finally, Motorola urges the Commission to reject the recommendation of M/A-Com to reduce certain Adjacent Channel Coupled (ACP) requirements for 6.25 kHz, 12.5 kHz and 25 kHz bandwidth equipment.

**I. Background.**

In this phase of this proceeding, the Commission is considering technical changes to the rules applicable to 700 MHz public safety and guard band operations regulated under Part 90 and

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<sup>1</sup> *The Development of Operational, Technical and Spectrum Requirements for Meeting Federal, State and Local Public Safety Communication Requirements Through the Year 2010, WT Docket No. 96-86, Fifth Memorandum Opinion And Order, Sixth Report And Order, and Seventh Notice Of Proposed Rulemaking, 20 FCC Rcd 831 (2005) (hereinafter 7<sup>th</sup> NPRM).*

Part 27 of its rules. Nearly two dozen parties filed formal and informal comments to the Commission's 7<sup>th</sup> *NPRM*. For its part, Motorola commended the FCC's diligence in ensuring that the rules applicable to 700 MHz operations adequately balance licensee flexibility with interference protection and interoperability.<sup>2</sup> In responding to the majority of the discussion contained in the 7<sup>th</sup> *NPRM*, Motorola urged the FCC to:

- Adopt TIA-recommended Adjacent Channel Power (ACP) tables for 50 kHz and 100 kHz channel bandwidths.
- Require vendors that configure multiple transmitters/carriers within a single channel bandwidth to certify the multiple transmitters together at the appropriate ACP channel bandwidth.
- Reduce the ACP limit in the paired receive band from -100 dBc to -85 dBc.
- Adopt corresponding changes to the ACP limits for 700 MHz Guard Band operations.
- Allow 700 MHz licensees to conduct secondary fixed operations and to transmit the required station identification in the digital mode.
- Eliminate the "in-band" emissions restrictions on 700 MHz Guard Band operations and provide greater flexibility in the deployment of transmitters of different bandwidths in the Guard Band spectrum.
- Reject the recommendation of Nortel and EADS to amend the first ACP offset value and measurement bandwidth for 12.5 kHz bandwidth transmitters.
- Adopt TIA-902 (SAM) as the 700 MHz wideband interoperability standard and require that all wideband radios be capable of operating on all the wideband interoperability channels using the TIA-902 (SAM) standard.
- Modify its rules to reference updated ANSI/TIA/EIA documents.
- Adopt the Advanced Encryption Standard as the existing encryption standard for the 700 MHz interoperability channels
- Clarify that the low power channels available under Section 90.531(b)(4) are exempt from the mandatory trunking requirements.

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<sup>2</sup> Comments Of Motorola To The Seventh Notice Of Proposed Rulemaking, WT Docket No. 96-86, submitted May 27, 2005 (Motorola Comments). Unless otherwise noted, all comments referenced in this document were filed in WT Docket No. 96-86 on May 27, 2005.

Motorola continues to support its initial recommendations. Motorola files these replies to address comments opposing the adoption of the TIA-902 (SAM) suite of standards as the wideband interoperability standard. Motorola also urges the Commission to move swiftly to adopt rules permitting digital station identification proposal and to reject certain modifications to the existing ACP requirements.

## **II. The Commission Should Adopt the TIA-902 (SAM) Standard as the 700 MHz Wideband Interoperability Standard.**

The 7<sup>th</sup> *NPRM* noted that the Commission originally tasked the National Coordinating Committee (NCC) to develop the interoperability standards for both wideband and narrowband interoperability channels.<sup>3</sup> In July of 2003, the TIA – working in cooperation with the NCC – recommended that the FCC adopt Scalable Adaptive Modulation (identified by TIA as the TIA-902 (SAM) suite of standards) as the wideband interoperability standard. The NCC subsequently supported TIA’s recommendation and also urged the Commission to adopt TIA-902 (SAM).<sup>4</sup> The 7<sup>th</sup> *NPRM* tentatively concludes to adopt these recommendations.

In its comments, Motorola stated that it supported the Commission’s tentative conclusion that a single standard must be selected to ensure equipment compatibility and to achieve interoperability on the 700 MHz wideband interoperability channels.<sup>5</sup> Motorola noted that TIA-902 (SAM) is a published industry standard and was developed with industry consensus with

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<sup>3</sup> 7<sup>th</sup> *NPRM* at ¶¶49, 50.

<sup>4</sup> See letter from Kathy Wallman, Chair, National Coordinating Committee to Michael Powell, Chairman, Federal Communications Commission, WT Docket No. 96-86, (July 25, 2003).

<sup>5</sup> Comments of Motorola at 10.

multiple equipment vendors supporting TIA-902 (SAM) during the NCC wideband interoperability standard review, adoption and recommendation process.<sup>6</sup>

Joining Motorola in supporting the adoption of TIA-902 (SAM) were the major public safety organizations who filed comments as the National Public Safety Telecommunications Council (“NPSTC”).<sup>7</sup> In its comments, NPSTC stated that:<sup>8</sup>

[T]he increasing responsibilities for both prevention and response now faced by the public safety community have heightened the importance of high speed data, imaging, and similar capabilities as mission critical requirements. These increased requirements reflect both heightened activity to combat terrorism and the need to address situations such as lost or abducted children, bomb threats, large fires, medical emergencies, and other multi-agency, multi-jurisdictional events. Therefore, NPSTC supports Commission adoption of a wideband data interoperability standard, including a requirement that 700 MHz wideband radios operating on the wideband interoperability channels do so in the TIA 902 (SAM) mode.

NPSTC concludes its analysis by noting that “[a]dopting the TIA-902 (SAM) standard as the defined ‘standard mode of operation’ on the wideband interoperability channels and requiring that all 700 MHz wideband radios be capable of operating on the wideband interoperability channels in the TIA-902 (SAM) mode will go a long way toward ensuring both voice and data interoperability in the future.”<sup>9</sup>

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<sup>6</sup> *Id.*

<sup>7</sup> NPSTC is comprised of the following public safety organizations: American Association of State Highway and Transportation Officials, American Radio Relay League, American Red Cross, Association of Public-Safety Communications Officials-International, Forestry Conservation Communications Association, International Association of Chiefs of Police, International Association of Emergency Managers, International Association of Fire Chiefs, International Association of Fish and Wildlife Agencies, International Municipal Signal Association, National Association of State Emergency Medical Services Directors, National Association of State Telecommunications Directors, and the National Association of State Foresters.

<sup>8</sup> Comments of NPSTC at 4.

<sup>9</sup> *Id.* at 5.

The New York State Office for Technology (New York State) and the Missouri State Highway Patrol (MSHP) also support the adoption of TIA-902 (SAM) as the 700 MHz wideband interoperability standard. New York State believes that the adoption of TIA-902 (SAM) would be “a good start” to achieving interoperability on the FCC designated interoperability channels, but also pointed out that “it will take more than a standard air interface to achieve true interoperability” and therefore also recommended that the Commission establish appropriate application standards for data transmission.<sup>10</sup>

Similarly, MSHP recognizes that physical layer standardization will not achieve interoperability among users by itself, but argues that the goal of enabling unit-to-unit subscriber based wideband data interoperability requires that the TIA-902 standard be adopted as a 700 MHz wideband data interoperability standard.<sup>11</sup>

In contrast to these public safety organizations, a number of commenters – including several that replied via a form letter – opposed the adoption of TIA-902.<sup>12</sup> The principal claims offered by the commenters are: 1) TIA-902 (SAM) is a “proprietary” standard and the licensing of intellectual property rights will increase the cost of equipment development,<sup>13</sup> 2) the standard is too complex and costly for many public safety organizations,<sup>14</sup> and 3) the technology is similar

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<sup>10</sup> Comments of the New York State Office for Technology, Statewide Wireless Network at 3, 4.

<sup>11</sup> Comments Of The Missouri State Highway Patrol at 4, 5.

<sup>12</sup> See e.g., Comments Of Kenwood USA Corporation In Response To Seventh Notice Of Proposed Rule Making, WT Docket No. 96-86, May 20, 2005, (Comments of Kenwood); Comments Of M/A-Com, Inc., On The Seventh Notice Of Proposed Rulemaking; Comments of the FCC Region 8 700 and 800 MHz Regional Planning Committees; Comments On Behalf Of The Coalition For Wideband Data Deployment (Coalition Comments).

<sup>13</sup> Coalition Comments at 9, Comments of Kenwood at 9, 10.

<sup>14</sup> Coalition Comments at 10, 11; Comments of Kenwood at 7, 8; Comments of Viking Communications at 2.



to iDEN technology and may therefore become a source of interference as has happened in the 800 MHz band.<sup>15</sup>

Motorola believes that these arguments are off-base. One common claim is that TIA-902 (SAM) is a proprietary standard and, therefore, the costs associated with licensing essential IPR will increase equipment costs to public safety users. To the contrary, TIA-902 (SAM) is a wideband data technology designed specifically to meet public safety requirements<sup>16</sup> that has been standardized following TIA and ANSI approved procedures. As the Commission is well aware, standards promote interoperability, eliminate misunderstandings or confusion between manufacturers and buyers with respect to products on which TIA standards or specifications are adopted, and provide assistance to the purchaser in selecting and obtaining the proper product for a particular need. TIA standardization work consists of discussion in an open forum, under rules published by TIA and approved by ANSI, in which representatives from a wide spectrum of interested groups offer contributions. In the case of TIA-902 (SAM), significant contributions were offered by EADS, M/A-COM, and Nortel Networks in addition to Motorola. Subsequent evaluations and deliberations led to a consensus on electrical and other properties of telecommunications components, equipment and systems and the published TIA-902 (SAM) standard.

Standards development organizations document the technology for a standard under well-defined procedures; they do not create the technology. ANSI/TIA procedures provide technical documentation and requirements for licensing of intellectual property on fair and reasonable

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<sup>15</sup> Coalition Comments at 13.

<sup>16</sup> The TIA 902 suite of wideband data standards were developed by TIA's TR-8.5 committee to be consistent with the Statement of Requirements adopted by the National Coordination Committees Interoperability Subcommittee, WG6 Wideband Data. The NCC's submittal was in turn developed based upon APCO Project 25/34 Statement of Requirements (P34SOR).

terms. With respect to TIA-902 (SAM), this documentation and licensing requirements are in place specifically to enable any manufacturer committed to serving public safety in developing equipment that conforms to the interoperability standard.

Companies like Motorola commit significant resources to developing technology. Where a company's intellectual property becomes an essential part of a standard, ANSI/TIA procedures require that intellectual property to be made available on fair and reasonable terms. These procedures provide a level playing field among manufacturers. Some manufacturers, like Motorola, choose to dedicate the resources needed to develop technology responsive to public safety requirements and to participate with other manufacturers in an open standards body process to define the standard. Those manufacturers who choose not to dedicate the resources to develop the technology and participate in the open standards process can still license the technology under fair and reasonable terms.

Motorola does indeed hold essential IPR on technologies that are part of the TIA-902 (SAM) standard. This fact was made known early in the standards process so other manufacturers were well aware of this claim as they participated in the development of the standard. More importantly, Motorola has gone on record with the NCC and offered to license its essential IPR for use of the TIA-902 (SAM) standard technology on the interoperability channels on a royalty-free basis<sup>17</sup> and now shares this same commitment with the Commission. As Motorola has gone above and beyond the ANSI requirements in an effort to provide the public safety community with interoperable mobile data solutions, any concerns over licensing fees are unfounded.

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<sup>17</sup> See attached, Letter from Chuck Jackson, Vice President and Director, System Operations, Commercial, Government and Industrial Solutions Sector, Motorola to Kathleen Wallman, Chair, Public Safety National Coordination Committee, July 10, 2003.

The comments of the Coalition for Wideband Data Deployment also argue that the TIA-902 standard is too complex and costly for many public safety organizations citing specifically “high power” and “highly linear power amplifiers” as design features that will impact the cost of deployment.<sup>18</sup> These parties also argue that the technology offers reduced range from other, unspecified, undocumented public safety technologies and that adopting TIA-902 (SAM) will especially affect rural agencies that typically require large area coverage as opposed to high throughput.<sup>19</sup>

As a general rule, physics does dictate that as the data rate increases, coverage area decreases, assuming that all other factors are held constant. However, the Coalition Comments ignore a key feature of TIA-902 (SAM) – the ability to adaptively balance the data rate and coverage requirement needs of different licensees. In fact, this adaptive capability was a key element as evaluated by user representatives and multiple manufacturers in the open TIA process that led to TIA-902 (SAM) being recommended as the interoperability standard. TIA-902 (SAM) implementations can exhibit similar coverage to existing narrowband systems through the utilization of dynamic radio link layer rate adaptation and state-of-the-art turbo forward error correction coding, even with radios that have less raw transmit power. The result is that the coverage of 50 kHz bandwidth channels can be similar to the coverage of more narrowband 12.5 kHz and 25 kHz bandwidth channels.

Turning to the third principal claim of those that oppose the adoption of TIA-902 (SAM), Motorola believes that there is no basis in fact for the implication that the technology might replicate the 800 MHz interference situation at 700 MHz. Some commenters claim interference

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<sup>18</sup> Coalition Comments at 11, 12.

<sup>19</sup> *Id.*

is a concern because TIA-902 (SAM) uses quadrature-amplitude modulation (QAM) like the iDEN technology.<sup>20</sup> The record in the 800 MHz proceeding well established that intermodulation and out-of-band emission interference between cellular systems and public safety systems is principally the result of dissimilar network architectures.<sup>21</sup> In no case has it been linked to QAM.<sup>22</sup> Since the deployment of TIA-902 (SAM) will be integrated with the deployment of associated voice systems, system planners will be able to avoid near-far situations that are associated with the inter-mixing of high-site public safety systems with cellular architectures. The 700 MHz Public Safety band is well planned and coordinated by the Regional Planning Committees. As such, the interference concern raised by in the Coalition Comments is little more than a red herring.

While supporting the adoption of TIA-902 (SAM), NPSTC, New York State and MSHP all recognize that the adoption of the TIA-902 (SAM) air interface alone is not sufficient to ensure wideband data interoperability. NPSTC, for example, affirmatively states that additional steps are needed “to address data application software compatibility and other operational

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<sup>20</sup> *Id.* at 13.

<sup>21</sup> See e.g., Letter from Steve B. Sharkey, Director, Spectrum and Standards Strategy Motorola, to Mr. Edmond Thomas, Chief, Office of Engineering and Technology, Federal Communications Commission, WT Docket No. 02-55, May 6, 2003 (“As a result of this difference in system deployment, public safety receivers in some areas experience a large relative difference between the desired signal strength of public safety systems and the undesired signal strength for CMRS operations. This large relative difference in signal strengths results in intermodulation interference, interference from out-of-band emissions, and receiver overload interference.”)

<sup>22</sup> Indeed, one of the major findings of the *Report and Order* in the 800 MHz proceeding was that the cause of 800 MHz public safety interference was not limited to Nextel’s iDEN-based system. See *Report And Order, Fifth Report And Order, Fourth Memorandum Opinion And Order, And Order*, WT Docket No. 02-55, 19 FCC Rcd 14,969 (2004) at ¶13 (“Despite the claims by some that licensees in the cellular telephone bands cause little interference to 800 MHz band public safety systems, strong evidence exists to the contrary”) footnotes omitted.

issues.”<sup>23</sup> Motorola agrees with NPSTC’s observation, however, that the “adoption of the TIA-902 (SAM) standard is a pre-requisite to the establishment of interoperable public safety wideband wireless communications systems” because “[w]ithout the communications platform provided by these technical standards, development of the software applications and operational procedures cannot move forward.” TIA-902 (SAM) is a technology that has been set forth under a standards development process with declaration of IPR and user review that can best serve this function.

Public safety organizations, led by the umbrella-group NPSTC, have concluded that their increasing use of wideband data in multi-jurisdictional events demands the adoption of a standard for use on the interoperability channels. TIA-902 (SAM) has been established in an open-industry forum with the participation of multiple equipment vendors and public safety user input. Its concept and performance in the public safety environment was proven in the long-running experimental system operated by Motorola in Pinellas County, Florida.

In view of all these factors, the Commission should therefore establish TIA-902 (SAM) as the wideband interoperability standard at 700 MHz as proposed in the *7th FNPRM*.

### **III. The Commission Should Expeditiously Allow 700 MHz Public Safety Licensees to Transmit Station Identification in the Digital Mode.**

Motorola and NPSTC both urged the Commission to adopt its proposal to conform the 700 MHz technical rules with those applicable to 800 MHz and 900 MHz licensees that operate in the digital mode in order to allow the required station identification to be transmitted digitally.<sup>24</sup> No other party addressed this issue.

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<sup>23</sup> *Comments of NPSTC* at 5.

<sup>24</sup> *Comments of Motorola* at 6, 7; *Comments of NPSTC* at 7, 8.

There is no controversy surrounding this necessary rule change. The Commission has previously determined that the underlying policy serves the public interest<sup>25</sup> and it has now satisfied all administrative requirements by providing public notice of the proposed change. Therefore, the Commission should move as quickly as possible to enact this policy in the 700 MHz bands.

Swift action is necessary because the existing rules could be interpreted to require manufacturers to include analog or morse code capabilities in 700 MHz radios to satisfy the existing requirements. This would unnecessarily raise the cost of equipment to public safety users. More complex or controversial items can be deliberated in subsequent orders.

#### **IV. The Commission Should Maintain the TIA-Recommended ACP Values.**

In its comments, M/A-Com urged the FCC to adopt the recommendations submitted by Nortel and EADS to adjust the first offset value for 12.5 kHz channels from 9.375 kHz to 9.55 kHz and to adjust the measurement bandwidth for the first offset value from 6.25 kHz to 5.9 kHz.<sup>26</sup> In addition, M/A-Com suggests similar modifications to the ACP tables for 6.25 kHz and 25 kHz transmitters, consistent with M/A-COM's previously submitted recommendations.<sup>27</sup> M/A-Com states that these actions would result in the use of more spectrally efficient technologies without increasing adjacent channel interference potential.<sup>28</sup>

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<sup>25</sup> See Comments of Motorola at n. 12.

<sup>26</sup> Comments Of M/A-COM, Inc. at 3.

<sup>27</sup> *Id.*

<sup>28</sup> *Id.*

In its comments, Motorola opposed the EADS/Nortel recommendations noting that the proposed relaxation of the ACP requirements was considered by the TIA and rejected by a majority of the participants because it reduces adjacent channel protection.<sup>29</sup>

M/A-Com has not submitted sufficient technical information to justify the adoption of these proposals. M/A-Com's assurance that the proposed changes will not impact adjacent channel systems is based on certain assumptions about receiver performance and filtering but they have provided no information to support or even clarify their assumptions. It is unarguable, however, that the net effect of these recommended changes would allow increased noise into adjacent channel systems and therefore should be assumed to have a negative effect.

While M/A-COM suggests that these proposed changes will allow the use of more spectrally efficient technologies, it has provided no specifics on the technologies that would benefit from this rule change or defined the increase in efficiencies that would result. Also, with the limited information provided, it is not clear why these proposed rule changes would provide a 1 dB gain in link budget. In sum, M/A-Com's proposed changes appear to be very narrowly targeted to accommodate some unspecified technology. Without additional specificity about this technology and how it will be implemented in the 700 MHz public safety bands, the Commission should reject this recommendation and instead favor the industry-consensus positions as submitted by TIA.

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<sup>29</sup> Comments of Motorola at 6.

**V. Conclusion.**

Motorola urges the FCC to expeditiously adopt its proposed changes to the technical rules for 700 MHz public safety and guard band operations consistent with the recommendations contained herein. This improved clarity and flexibility in the design and manufacture of 700 MHz equipment is urgently needed to address urgent Homeland Security and mission critical applications.

Respectfully Submitted,

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June 13, 2005

Attachment





**MOTOROLA**

**Date:** July 10, 2003

**To:** Kathleen Wallman  
Chair  
Public Safety National Coordination Committee

**From:** Chuck Jackson

**Subject:** Motorola's License Terms for 700 MHz Public Safety Wideband Interoperability Channels

Scalable Adaptive Modulation (SAM) has been recommended by TIA to the National Coordination Committee (NCC) as the wideband data interoperability standard in the 700 MHz Public Safety communication band in the U.S. All essential IPR for SAM wideband data has been identified and disclosed through the TIA process.

Motorola will license its SAM IPR essential to meet the TIA-902 standard for use on the 700 MHz Public Safety wideband interoperability channels on a royalty-free basis. Motorola will also license its SAM IPR essential to meet the TIA-902 standard for use on the 700 MHz Public Safety wideband general use channels on fair and reasonable terms per the TIA process.

Regards,

A handwritten signature in black ink, appearing to read 'Chuck Jackson'.

Chuck Jackson  
Vice President and Director  
System Operations  
Commercial, Government and Industrial Solutions Sector  
Motorola

**Cc:** Michael Wilhelm  
Glen Nash  
John Powell  
Ted Dempsey